August 15, 2013

Ms. Jean A. Mescher, Project Coordinator

Director, Environmental Services

McKesson Corporation

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San Francisco, CA 94104

Subject: Conceptual Site Model and Proposed Decision Unit Plan for the Arkwood, Inc. Site, Omaha, Arkansas; EPA ID# ARD084930148; Site ID: 0600124

Dear Ms. Mescher:

In 2012, USEPA requested McKesson to provide data and analysis indicating whether or not the Arkwood, Inc. site ("Site") in Omaha, Arkansas, which was previously investigated and remediated, was in compliance with the new risk assessment guidelines for dioxins and furans (PCDD/Fs).

The Site is the location of a former wood treating operation where pentachlorophenol (PCP) and creosote were used as treating fluids. The soil on the Site was contaminated with PCP and creosote. The responsible party, MMI (now McKesson Corporation) began a two-phase soil remedy under EPA oversight in 1994. The Phase I remedy was soil excavation, pretreatment (separation of soil from rock fragments) and storage of soil contaminated by wood treating fluids, e.g., PCP and creosote. The Phase II remedy was off-site incineration of soil fines. The excavated areas were backfilled with clean soil, a 6-inch clean soil cap was installed over the excavated areas, and the Site seeded. The soil remediation project was completed in December 1995.

A Deed Notice for the Site was filed on August 30, 2010. The Deed Notice is not in compliance with the requirements of the Record of Decision (ROD) for the Site, contains inaccurate meets and bounds, and does not protect the Site remedy. It is our understanding that an appropriate deed restriction will be filed for the Site.

McKesson contracted ChemRisk in September 2012 to provide assistance in responding to EPA's request for data and analysis indicating whether the Site complied with the new risk assessment guidelines for PCDD/Fs. After an initial search for relevant data, McKesson and ChemRisk performed the following work: 1) a Site inspection; 2) collection of a series of onsite and downstream ditch samples; and 3) performance of a screening level risk assessment. A total of 5 onsite or downstream samples and one

local background sample were collected and analyzed. ChemRisk reported the results of its work in its December 18, 2012 report entitled *Site Inspection and Screening Risk Assessment for Dioxins and Furans*. (ChemRisk PCDD/Fs Report). .

Under cover of a May 9, 2013 USEPA letter, USEPA and ADEQ provided comments to McKesson on the ChemRisk PCDD/Fs Report. As a next step, EPA stated in its cover letter that "EPA's direction for the dioxin reassessment path forward is for McKesson to submit an updated Site Conceptual Model (CSM). An updated CSM would set the foundation for the potential sources, exposure pathways, and receptors, prior to any further sampling activities."

This letter report provides the requested Site CSM. The CSM addresses the potential sources, exposure pathways, and receptors for PCDD/Fs. The CSM will "set the foundation" for USEPA and McKesson to reassess the remediated Site's compliance with current PCDD/Fs risk criteria.

Furthermore, a summary of 1995 post-excavation sampling data and 2012 sampling data is presented and utilized to develop "decision units" (DUs) for the Site. In addition, we have proposed an approach for further soil sample collection to confirm PCDD/Fs concentrations for each DU. The USEPA (2011) guidance for incremental composite soil sampling for PCDD/Fs was utilized to develop a set of 6 areas that will be designated as separate DUs, each of which will be sampled at 30 evenly distributed locations to obtain a single composite sample result for PCDD/Fs. This composite sample will be considered the representative PCDD/Fs soil concentration for each DU. The proposed DU designations and sample collection approach will enable USEPA and McKesson to generate the data needed to determine the remediated Site's compliance with current PCDD/Fs risk criteria, given recent changes in the toxicity criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) (IRIS, 2012; USEPA, 2009).

Conceptual Site Model Information

According to USEPA (2011) guidance, a CSM pertaining to PCDD/F soil concentrations at the Site should contain appropriate historical information regarding the past Site activities and information relevant to sources, transport pathways, and completed exposure routes that may be relevant to current and future Site operation and use conditions. Accordingly, in the attached figures and tables we have provided the information which characterizes the relevant parameters based on available documents and data resources. The Site history information is contained in the EPA online information for the Site (a short summary of the soil remedy implemented is set forth above) and was used to develop the CSM. The post-excavation sampling data and Site characteristics that define potential soil exposure routes for risk assessment purposes are presented in this report.

Topographic maps were obtained from USGS and Google Maps identifying the steep terrain surrounding the Site. The Site is a more gently-sloping area carved out from adjacent hillsides surrounding most of the Site perimeter. Figure 1 identifies the Site perimeter in reference to the topographic features delineated by USGS. Figure 2 illustrates that the Site is bordered by contiguous steep uphill gradients on approximately three-quarters of the Site perimeter on a Google Maps depiction of local topography. Only on the northwestern section of the Site perimeter is there a downhill gradient that descends approximately

12-15 feet to a ditch area adjacent to the railroad tracks; this railroad ditch area gradually slopes towards the railroad tunnel in an easterly direction. A bird's eye, oblique-angled aerial photograph taken from the western end (main entrance) of the Site in Figure 3 illustrates the gradual westerly slope of the Site towards the main entrance at an approximate grade of 5 to 10 degrees that promotes sheet flow of rainwater across the vegetated Site. In 1994, prior to any remedial work at the Site, stormwater drainage ditches were constructed, including the ditch along the northern perimeter of this western section of the Site, near the current fenceline of the facility. The fenceline along the northwestern Site perimeter is at the top of the slope that descends toward the railroad ditch area at an approximate grade of 45-60 degrees. The surface water flow during rain events currently drains westerly towards the Site entrance and is intercepted by stormwater ditches on the north, south and west edges of the Site. The two on-Site drainage ditches meet and discontinue at the natural berm area beside the main entrance road just beyond the confluence of the main road and the former haul road that turns off to the right (south) (Figure 3). This Site configuration provides for the collection and percolation of rainwater within these stormwater ditches except in extreme rain events, when overflow of the ditches can lead to excess stormwater release at the natural berm area, which can then flow down to the railroad ditch area.

Figure 4 provides an overview of the discrete areas excavated in 1994-95 (within the black outlines) and the much larger contiguous area of the Site that was subsequently graded and capped (within the blue outline). The capped zone extends over approximately 82% of the Site surface area and completely covers the discrete onsite excavated areas and railroad ditch, including up to the building foundations and the drainage ditches (Figure 4). Notably, the eastern-most area of the Site was not used for storage or processing of treated wood and thus may be considered a background zone. Likewise, the western-most triangular area at the Site's main entrance was not used for storage or processing of treated wood. However, the remainder of the Site was graded and covered with a 6-inch clean cap per the USEPA-approved remedial design in 1995.

Table 1 provides a summary of the analytical results for the post-excavation confirmation soil sampling for PCDD/Fs conducted at the Site in 1995 prior to final grading and installation of a 6-inch clean soil cap. These data are overlaid on the Google Map photo of the Site in Figure 5, showing the location and concentration ranges reported in 1995 as TCDD Toxicity Equivalents (TEQ) using the concurrent International-TCDD Toxicity Equivalence Factors (I-TEF) approach. Table 1 illustrates that based on the ditch soil PCDD/F sample data obtained in 2012, the I-TEF approach overstates the most current EPA-endorsed approach by the World Health Organization (WHO 2005 as adopted by USEPA, 2010) by an average factor of 1.28. The 1995 post-excavation sampling data expressed in the current TEF scheme indicates an average TEQ concentration of 5.85 $\pm$ 3.77 ppb (mean/SD) beneath the capped soil zone based on 37 composited samples from the excavation areas. The soil for the 6-inch clean cap was obtained from a reportedly clean excavation from Harrison, AR, but no soil PCDD/F analytical results for samples taken from this material were found in the available records. We understand that the stormwater drainage ditches surrounding the portions of the Site where wood treatment-related operations were conducted were installed in 1994, prior to any excavation, grading and capping of the Site. The 6-inch clean soil cap extends to the edge of the ditches onsite.

Figure 6 provides a summary diagram of the CSM for PCDD/Fs risk assessment purposes, assuming industrial use in the future for both the Site and the adjacent railroad ditch area. PCDD/Fs from the areas

affected by former processing and/or storage of treated wood materials is considered the main potential source of PCDD/Fs exposure, although some contamination may have been deposited in the drainage ditches and uncapped areas prior to or during Site closure activities in 1995. The 6-inch soil cap area is not expected to be the source of any substantial current or future PCDD/F exposure based on the origin of the soil used for capping and the cap's maintenance since installation. Based on the current Site configuration, the only potential offsite transport pathway would be stormwater and associated sediment flowing down to the railroad ditch from overflow of the onsite drainage ditches during exceptionally heavy rain events. As noted above, all stormwater draining from the capped area of the Site is captured by the drainage ditch system, and there has been no history of erosion events or other ditch or cap failure. Accordingly, sediment PCDD/F transport creates a plausible completed exposure pathway only for onsite workers and for trespassers. The direct soil exposure pathways for PCDD/Fs include incidental soil ingestion and dermal contact.

The inhalation pathway is excluded. It is considered negligible relative to the direct soil ingestion and dermal contact pathways since the potentially contaminated areas of the Site have been capped and fully vegetated; therefore, appreciable dust release is not plausible (Paustenbach et al. 2006). The surface water pathway is also excluded. There is no seasonal or permanent body of water onsite or in the railroad ditch area. Likewise, the groundwater transport pathway is considered incomplete due to the insoluble nature of PCDD/Fs. Finally, there are no plausible future residential uses of the Site since the ROD restricts future use to industrial development. A deed restriction is required to restrict future use to industrial development and prohibit Site uses from disturbing the integrity of the Site cap and drainage systems.

Table 1. Summary of 1995 and 2012 PCDD/F Sampling Results for the Arkwood Site.

Sampling Event	Sample ID	Cells Included In Composites[a]	I-TEF TCDD TEQ Concentration (ppb)	WHO 2005 TCDD TEQ Concentration (ppb)
1995	Cell 1	Cells 1, 9, 10, 11	8.5	***6.65***
1995	Cell 2	Cells 2, 3, 4, 5, 6, 7	4.7	***3.70***
1995	Cell 2	NA	8.8	***6.86***
1995	Cell 3	Cells 2, 3, 4, 5, 6, 7	4.7	***3.70***
1995	Cell 3	NA	10.2	***7.92***
1995	Cell 4	Cells 2, 3, 4, 5, 6, 7	4.7	***3.70***
1995	Cell 4	NA	12.9	***10.02***
1995	Cell 5	Cells 2, 3, 4, 5, 6, 7	4.7	***3.70***
1995	Cell 5	Cells 5, 6, 7	11.8	***9.20***
1995	Cell 6	Cells 2, 3, 4, 5, 6, 7	4.7	***3.70***
1995	Cell 6	Cells 5, 6, 7	11.8	***9.20***
1995	Cell 7	Cells 2, 3, 4, 5, 6, 7	4.7	***3.70***
1995	Cell 7	Cells 5, 6, 7	11.8	***9.20***
1995	Cell 8 (Floor)	NA	0.25	***0.20***
1995	Cell 8 (Walls)	NA	0.25	***0.20***
1995	Cell 8	Cells 8, 9, 11	16.8	***13.1***
1995	Cell 9	Cells 1, 9, 10, 11	8.5	***6.65***
1995	Cell 9	Cells 8, 9, 11	16.8	***13.1***
1995	Cell 10	Cells 1, 9, 10, 11	8.5	***6.65***
1995	Cell 10	NA	11.5	***8.96***
1995	Cell 11	Cells 1, 9, 10, 11	8.5	***6.65***
1995	Cell 11	Cells 8, 9, 11	16.8	***13.1***
1995	Cell 12	Cells 12, 13	9.2	***7.21***
1995	Cell 13	Cells 12, 13	9.2	***7.21***
1995	Cell 14a	Cells 14a, 14b, 14c, 15b	7.4	***5.76***
1995	Cell 14b	Cells 14a, 14b, 14c, 15b	7.4	***5.76***
1995	Cell 14c	Cells 14a, 14b, 14c, 15b	7.4	***5.76***
1995	Cell 15a (Floor)	NA	1.4	***1.12***
1995	Cell 15a (Walls)	NA	3.9	***3.04***
1995	Cell 15b	Cells 14a, 14b, 14c, 15b	7.4	***5.76***
1995	Cell 16 (Ashpile)	NA	0.22	***0.17***
1995	Cell 16	NA	1.4	***1.12***
1995	Cell 17 (Sinkhole Floor)	NA	0.49	***0.38***
1995	Cell 17 (Sinkhole Walls)	NA	3.1	***2.39***
1995	Cell 18 (Railroad) (Floor)	NA	1.0	***0.80***
1995	Cell 18 (Railroad) (Walls)	NA	11.0	***8.56***
1995	Cell 18	NA	14.8	***11.5***
2012	Sample 1	NA	0.42	0.33
2012	Sample 2	NA	2.0	1.60
2012	Sample 3	NA	0.61	0.47
2012	Sample 4	NA	0.43	0.32
2012	Sample 5	NA	0.52	0.39
2012	Sample 6	NA	0.052	0.043

a For composite cell samples, TEQs are representative of all of the cells in the composite.

Bold/Italics values: Because congener-specific data were not available for the 1995 samples, the WHO 2005 TCDD TEQ values were estimated by multiplying the I-TEF TEQ concentration by a factor of 0.78, the average for the 6 samples collected in 2012 that had full congener-specific PCDD/F profiles.

Proposed Decision Unit Plan

Figure 7 illustrates the first two proposed areas corresponding to "decision units" (DUs) at this Site in accordance with USEPA (2011) guidance. DU #1 is the uncapped eastern section of the Site where no treated wood storage or processing activities were conducted based on available information. Data from this area is likely to represent background concentrations for PCDD/Fs. DU #2 is the capped area of the Site that covers all of the onsite excavated areas (Figure 4); data from this area will determine if there is any evidence of cap contamination that occurred during cap installation or due to cap breach after installation in 1995. These two DUs comprise the vast majority of Site surface area relevant to potential receptor (onsite worker and trespasser) exposures.

Figure 8 illustrates 4 additional proposed DUs that focus on the stormwater drainage pathways onsite and the adjacent off-Site railroad ditch area. DU #3 is the northern perimeter ditch area spanning from the natural berm area on the western side of the Site to the northeastern-most perimeter adjacent to an excavated and capped area. DU #4 is the southern perimeter ditch area that also spans from the natural berm area on the western side of the Site to the southeastern-most perimeter adjacent to an excavated and capped area. DU #5 is the sedimentation zone and basin (natural berm area) formed by the confluence of the north and south perimeter ditches; this is the area where 2012 ditch sampling events (independent samples, not composites) revealed soil concentrations of 0.328 ppb and 1.598 ppb TEQ. For DUs #3, 4 and 5, the incremental composite sampling approach should address the walls and floor of each ditch or basin area that is below the plane of the general grade of the surrounding areas in order to avoid sampling any adjacent capped areas.

Figure 8 also identifies DU #6, which corresponds to the off-Site railroad ditch area that can receive stormwater overflow from the natural berm area of the Site during exceptionally heavy rain events. This railroad ditch area is a relatively flat zone immediately downhill from the natural berm area and is adjacent to the railroad tracks, with a slight grade eastward towards the railroad tunnel. Sampling over the span of this ditch area from the natural berm area to the railroad tunnel using the incremental composite sampling approach will evaluate whether any offsite PCDD/F transport has occurred. It will also provide insight regarding the proper interpretation of the relatively higher concentration sample collected from the natural berm area on-Site (1.598 ppb TEQ) in 2012.

Conclusions

The Site CSM for PCDD/Fs will "set the foundation" for USEPA and McKesson to reassess the remediated Site's compliance with current PCDD/Fs risk criteria. The CSM is based on historical activities, available analytical data and current Site conditions. Furthermore, ChemRisk has identified a total of 6 DUs for the Site. These DUs were developed and will be sampled following EPA guidance to confirm PCDD/Fs concentrations. The results for each DU will enable USEPA and McKesson to evaluate the compliance of the remediated Site with relevant PCDD/Fs risk criteria given recent changes in the toxicity criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD).

After the EPA approves the proposed CSM, a work plan detailing the sampling methods and analytical procedures will be prepared and submitted for agency approval.

Signed,

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President and Managing Principal

References

Paustenbach, D.J., K. Fehling, P. Scott, M. Harris, and B. Kerger. 2006. "Identifying Soil Clean-up Criteria for Dioxins in Residential Soils: How has 20 Years of Research and Risk Assessment Experience Affected the Analysis?" Journal of Toxicology and Environmental Health, Part B, 9:87-145.

IRIS. 2013. Integrated Risk Information System online database, accessed August 1, 2013.

USEPA. 2009. Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites, Public Review Draft, December 30, 2009. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation, Washington, D.C.

USEPA. 2010. Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds. U.S. Environmental Protection Agency, Office of the Science Advisor, Risk Assessment Forum, Washington, D.C. EPA/100R 10/0005.

USEPA. 2011. User Guide. Uniform Federal Policy, Quality Assurance Project Plan Template for Soil Assessment of Dioxin Sites, September 2011 U.S. Environmental Protection Agency, Washington, DC.